COMPRESSION PADDLE MIXER

BACKGROUND OF THE INVENTION

This invention relates to paddle mixers of particulate substances with liquids and in particular to paddles having mixing blades oriented to compress the particulate substances and liquids together for dissolving and diffusing lumps, unmixed accumulations and bubbles.

Paddle mixers are well known historically. A wide variety have been devised for mixing various types and forms of particulate substances with various types and forms of liquids. None are known, however, to have compression paddles that are oriented for application of compressively mixing force on the particulate substances and the liquids to dissolve and to diffuse lumps and inadequately mixed accumulations or bubbles in a manner taught by this invention.

It is quite common knowledge that lumps and globs of inadequately mixed particulate substances in mixtures with liquids can be squeezed compressively to cause them to dissolve, diffuse and disintegrate into a mix. Regardless, however, paddle mixers and barrel mixers alike continue to rely on primarily agitative action that does not squeeze or compress the particulate substances and liquids. Consequently still required for conventional mixing are (1) pre-mix of particulate substances that are likely to lump and (2) gradual addition of liquid to particulate substances during mixing action. This invention eliminates both of these conventional mixing steps for mixing most particulate substances and liquids.

Examples of most-closely related known but different devices are described in the following patent documents:

Patent No. (U.S. unless stated otherwise)	Inventor	Issue Date
4,175,875	Van Horbek	11-27-1979
DE 3,907,536		03-08-1989
3,166,302	Dixon, *et al.*	01-19-1965
3,249,342	Mikkelsen	05-03-1966
5,772,318	Vadnais	06-30-1998
5,470,148	Gorr, *et al.*	11-28-1995
5,030,011	Kronberg	07-09-1991
2,179,271	Pick	11-07-1939
4,844,355	Kemp, Jr., *et al.*	07-04-1989

SUMMARY OF THE INVENTION

Objects of patentable novelty and utility taught by this invention are to provide a compression-paddle mixer which:

dissolves and diffuses lumps of inadequately mixed accumulations of particulate substances and liquids being mixed;

squeezes out gaseous bubbles in particulate substances and liquids being mixed;

allows adding particulate substances and liquids together in a mixing container before being mixed;

avoids or decreases requirement of premixing pluralities of particulate substances prior to adding liquids without lumping;

avoids requirement for successive adding of liquids to particulate substances of mixtures;

allows insertion of a mixing paddle into and removal from particulate substances and mixtures containing large particles;

allows insertion of a mixing paddle into and removal from particulate substances and mixtures that contain sand and gravel;

provides for rotation of the mixing paddle with a wide selection of rotational equipment;

is adaptable to mixture of a wide selection of particulate substances and liquids;

is adaptable to mixture with a wide selection of sizes and structural consistencies of mixer paddles and mixing containers; and

is well suited to mixing mortar sand, cement and water all at the same time for construction work.

This invention accomplishes these and other objectives with a compression-paddle mixer having a compression paddle that includes paddle blades juxtaposed colinearly to a paddle rod. The paddle blades include one or more sets of two paddle blades having channel-funneled orientation on paddle spokes that are extended radially from the paddle rod. The channel-funneled orientation includes a leading-edge separation of the paddle blades that is larger than a trailing-edge separation of the paddle blades in a direction of rotation of the paddle blades transmitted by rotation of the paddle rod in a mix container. The compression paddle can be sized, shaped and structured for use with select sizes, shapes and structures of mix containers for select mixing applications.

The above and other objects, features and advantages of the present invention should become even more readily apparent to those skilled in the art upon a reading of the following detailed description in conjunction with the drawings wherein there is shown and described illustrative embodiments of the invention.

BRIEF DESCRIPTION OF DRAWINGS

This invention is described by appended claims in relation to description of a preferred embodiment with reference to the following drawings which are explained briefly as follows:

FIG. 1 is a side view of a compression paddle;

FIG. 2 is a top view of the **FIG. 1** illustration;

FIG. 3 is a side view of a small compression paddle for illustrating size difference ranging from barrel-plurality size for the **FIG. 1** illustration to pint-plurality size for the **FIG. 2** illustration and including intermediate sizes;

FIG. 4 is a top view of the **FIG. 3** illustration;

FIG. 5 is a partially cutaway side view of a pint-plurality size of compression-paddle mixer that includes a mix container having a handle to illustrate its small size;

FIG. 6 is a partially cutaway side view of a large compression-paddle mixer that includes a mix container for illustrating size difference ranging from barrel-plurality size for the **FIG. 6** illustration to pint-plurality size for the **FIG. 5** illustration and including intermediate sizes;

FIG. 7 is a top view of the compression-paddle mixer that includes a compression paddle having six sets of paddle blades in a mix container having a valved bottom;

FIG. 8 is a partially cutaway side view of a bottom portion of the **FIG. 7** illustration that includes a riser to position the mix container above a use platform for bottom-discharge access; and

FIG. 9 is a top view of a compression-paddle mixer having a plurality of sets of paddle blades in mixing relationship to lumps, globs or accumulations of different types of substances being mixed in a mix container.

DESCRIPTION OF PREFERRED EMBODIMENT

Listed numerically below with reference to the drawings are terms used to describe features of this invention. These terms and numbers assigned to them designate the same features throughout this description.

1. Compression paddle
2. Sets
3. Paddle blades
4. Paddle spokes
5. Paddle rod
6. Power source
7. Small mix container
8. Large mix container
9. Channel-funnel inlets
10. Direction-arrow arc
11. Channel-funnel outlets
12. Rod insertion end
13. Power-source connection
14. Container bottom
15. Blade bottom
16. Valved opening
17. Riser
18. Container-support surface
19. Mix accumulations
20. Mix
21. Accumulation discharge

Referring to **FIGS. 1-4**, a compression-paddle mixer has a compression paddle **1** with one or more sets **2** of two paddle blades **3** on paddle spokes **4** that are extended radially from a paddle rod **5**. The paddle blades **3** are juxtaposed colinearly to the paddle rod **5** and to each other.

Referring to **FIGS. 1-6**, the paddle-rod **5** has a direction of rotation that is transmitted from a predetermined power source **6** that can include an engine, a motor or a hand crank which can be anchored to a small mix container **7**, a large mix container **8** or can be hand-held separately for mixing particulate substances, liquids or combinations of particulate substances and liquids. The one or more sets **2** of two paddle blades **3** have circumferential travel in a direction that is transmitted through the paddle spokes **4** by the rotation of the paddle rod **5**.

The sets **2** of the two paddle blades **3** have channel-funneled orientations in the direction of the circumferential travel of the sets **2**. The channel-funneled orientations include channel-funnel inlets **9** having funnel-inlet areas intermediate leading edges of the paddle blades **3** of the sets **2** in the direction of the circumferential travel of the sets **2** that is indicated by direction-arrow arc **10**. The channel-funneled orientations include channel-funnel outlets **11** having funnel-outlet areas intermediate trailing edges of the paddle blades **3** of the sets **2**. The funnel-inlet areas are predeterminedly larger than the funnel-outlet areas.

Referring to **FIGS. 1-8**, The channel-funneled orientations have compression ratios that are defined by ratios of the channel-funnel inlet areas to the channel-funnel outlet areas of the one or more sets **2** of the two paddle blades **3**. The compression ratios are generally higher predeterminedly for mixes having high liquidity than for mixes having low liquidity relatively.

The rotation of the paddle rod **5** has a speed of rotation that is higher predeterminedly for mixes having the high liquidity than for the mixes having the low liquidity.

The compression paddle **1** has size, shape and structure articulated for predetermined quantities of mix that can range from one-to-pluralities of barrels for the large mix container **8** to one-to-pluralities of pints of the small mix container **7**.

The mix containers ranging from the small mix container **7** to the large mix container **8** have a cylindrical interior periphery for a predetermined quantitative capacity of a plurality of select quantitative units ranging from pints to barrels. The compression paddle **1** has a paddle radius defined by a longest extremity of the compression paddle **1** from a center of the paddle rod **5** for articulation of the compression paddle **1** to fit and to rotate predeterminedly within the cylindrical interior of the intended small mix container **7** or the intended large mix container **8**

designedly. The paddle blades **3** have lengths that proximate the length of the cylindrical interior periphery of the intended small mix container **7** or the intended large mix container **8.**

The compression paddle **1**, the small mix container **7** and the large mix container **8** have structure that is articulated for mixing predetermined consistencies of mix.

For articulation of the compression paddle **1**, the small mix container **7** and the large mix container **8** selectively for production-item mixing, the predetermined consistencies of mix include particulate substances having construction-item consistencies of gravel, sand, cement, mortar, clay, alkalines and metallic particles selectively. Liquids for the production-item mixing include liquids having consistencies of water, liquidity modifiers, acid and petrochemicals selectively.

For articulation of the compression paddle **1**, the small mix container **7** and the large mix container **8** selectively for non-production-item mixing, the predetermined consistencies of mix include non-production-item consistencies of flour, sugar, food particles, dyes and seasoning selectively. Liquids for the non-production-item consistencies of mix can include water, liquid food substances, honey, coloring, alcohol and preservatives selectively.

For most uses, the paddle blades **3** preferably, but not necessarily, have lengths which are predeterminedly longer than two radii of the compression paddle **1**.

The paddle blades **3** have blade edges and blade thicknesses structured for ease of insertion into and removal from predetermined mix in the small mix container **7** and the large mix container **8** selectively. The paddle rod **5** has a rod insertion end **12** and rod thickness structured for ease of insertion into and removal from the predetermined mix. The paddle spokes **4** have thicknesses and structure

articulated for ease of insertion into, rotation in and removal from the predetermined mix.

The paddle rod **4** has a rod-power end with a power-source connection **13** that is articulated for rotation-transmissive connection of the paddle rod **4** to the predetermined power source **6**.

The small mix container **7** and the large mix container **8** can include a container bottom **14** that is flat and orthogonal to an axis of the paddle rod **4**. Preferably the paddle blades **3** have blade bottoms **15** that travel circumferentially in predetermined proximity to the container bottom **14**.

As shown for the large mix container **8** in **FIGS. 7-8**, the container bottom **14** can include a valved opening **16**. Optionally for the valved opening **16**, the container bottom **14** includes a riser **17** with which the container bottom **14** is raised predeterminedly above a container-support surface **18** for allowing exit of the mix.

The one or more sets **2** of the paddle blades **3** can include two sets **2** as shown in **FIGS. 1-6** or more as depicted by six sets **2** in **FIGS. 7-9**.

Referring to **FIGS. 1-9**, mix accumulations **19**, which can include lumps, are depicted in **FIG. 9** as being mixed, broken up, disintegrated, dissolved and diffused variously for different mix consistencies by the channel-funneled orientations of the sets **2** of the paddle blades **3** from rotation of the paddle rod **5** in the direction of circumferential travel indicated by the direction-arrow arc **10**. The mix accumulations **19** are forced into the channel-funnel inlets **9** and funnel-compressed in directions of the channel-funnel outlets **11** by force of the circumferential travel of the sets **2** against resistance of mix **20** and against resistance of other mix accumulations **19**. Released from the mix accumulations **19** at the channel-funnel outlets **11** are selections of consistencies of accumulation discharge **21** represented by illustrations of selections of fineness and shape.

This compression-paddle mixer provides not only improved agitative mixing but also eliminates conventional mixing steps of (1) pre-mix of particulate substances that are likely to lump and (2) gradual addition of liquid to particulate substances during mixing action with the compression paddle **1** in optional working relationship with the small mix container **7** and the large mix container **8** as described and claimed.

A new and useful compression-paddle mixer having been described, all such foreseeable modifications, adaptations, substitutions of equivalents, mathematical possibilities of combinations of parts, pluralities of parts, applications and forms thereof as described by the following claims and not precluded by prior art are included in this invention.